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Résumé : Les attaques perpétrées contre les Etats-Unis le 11 septembre 2001 ainsi que d'autres survenues dans le monde posent la question de la responsabilité des gouvernements et du secteur privé dans la réduction du risque terroriste et, plus particulièrement, celle de savoir qui devrait payer pour les pertes économiques liées aux attentats.

Suite aux événements du 11 septembre qui causèrent plus de 35 milliards de dollars de pertes assurées, les assureurs mirent en garde qu'une autre attaque de cette ampleur pourrait infliger des dommages irréparables à l'industrie de l'assurance, et que l'incertitude associée au risque terroriste en faisait, de fait, un risque non-assurable. Ainsi, début 2002, pas moins de 45 états américains permettaient aux assureurs d'exclure ce risque de leurs couvertures.

En cette absence d'offre d'assurance par le secteur privé, la loi du Terrorism Risk Insurance Act of 2002 (TRIA), qui instaure une couverture nationale annuelle à hauteur de 100 milliards de dollars, fut votée par le Congrès américain le 26 novembre 2002 et signé par le Président Bush le mois suivant. Cette couverture, fondée sur un partenariat entre industrie de l'assurance et gouvernement fédéral, expire le 31 décembre 2005. A ce jour (juillet 2004), l'après 2005 demeure incertain aux Etats-Unis.

Prenant en compte la réaction des marchés d'assurances américains depuis le 11 septembre 2001 et les caractéristiques très particulières du risque terroriste comme risque à grande échelle, nous soutenons que le gouvernement fédéral doit continuer à jour un rôle important de concert avec le secteur privé pour couvrir les pertes économiques résultantes d'éventuelles attaques futures. Néanmoins, TRIA n'est sans doute pas la meilleure manière de résoudre la question.

Puisque l'existence d'un système de couverture financière est une composante clé de toute stratégie nationale de lutte contre le terrorisme, cet article entend proposer une analyse constructive au débat en passe d'être porté à l'agenda au plus haut niveau du pays. En outre, nous proposons un programme spécifique alternatif au système TRIA pour couvrir les entreprises opérant aux Etats-Unis quand celui-ci expirera.

Abstract : The terrorist attacks on September 11, 2001 (9/11) against the United States as well as other large-scale attacks worldwide raises the fundamental question as to what are the responsibilities of the public and private sectors in reducing the risks of terrorist attacks and who should pay for future losses should the terrorists be successful?

In the aftermath of the 9/11 attacks, which inflicted more than 35 billion dollars of insured losses, many insurers warned that another event of comparable magnitude could do irreparable damage to the industry. Furthermore, they contended that the uncertainties surrounding terrorism risk were so significant that it was, in fact, an uninsurable risk. By early 2002, 45 states in the U.S. permitted insurance companies to exclude terrorism.

The Terrorism Risk Insurance Act of 2002 (TRIA), which provides for up to $100 billion of terrorism insurance, was passed by U.S. Congress on November 26, 2002 and signed into law by President Bush the following month. The Act, based on risk sharing between the insurance industry and federal government, expires on December 31, 2005.

Currently it is unclear what type of terrorism insurance program will emerge in the United States after 2005. Given the developments since September 11th and the specific characteristics of large-scale international terrorism, we contend that government needs to continue to play an important role in concert with the private sector in providing insurance against losses from this type of extreme event.

However, as we suggest in this paper, TRIA may not be the most desirable way for the federal government to assist the private sector in providing insurance against terrorism. As a sustainable terrorism insurance program is a key component of any national strategy for homeland security and that it is still on the agenda in the United States, this papers aims at providing a discussion on several alternatives. It suggests a specific national program for covering firms operating in the U.S. against terrorism when TRIA expires.

Mots clés : Terrorisme - Evénements extrêmes - Etats-Unis - Assurance - Programmes nationaux de couverture - Politiques publiques - Marchés financiers - 11 septembre 2001

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Introduction[*]

The terrorist attacks on September 11, 2001 (9/11) against the United States raises the fundamental question as to what are the responsibilities of the public and private sectors in reducing the risks of terrorist attacks and who should pay for future losses should the terrorists be successful?

Prior to September 11, 2001 terrorism coverage in the United States was an unnamed peril in most standard all-risk commercial and homeowners policies covering damage to property and contents. Even after the first attack on the World Trade Center (WTC) in 1993 insurers did not view terrorism as a risk that should be explicitly considered when pricing their commercial insurance policy because losses from terrorism had historically been small and, to a large degree, uncorrelated. Attacks of a domestic origin were isolated, carried out by groups or individuals with disparate agendas, neither creating major economic disruption nor many casualties (Kunreuther and Pauly, 2004).

In the aftermath of the 9/11 attacks many insurers warned that another event of comparable magnitude could do irreparable damage to the industry. Furthermore, they contended that the uncertainties surrounding terrorism risk were so significant that it was, in fact, an uninsurable risk. By early 2002, 45 states in the U.S. permitted insurance companies to exclude terrorism from their policies except for workers' compensation insurance policies that cover occupational injuries without regard to the peril that caused the injury. (U.S. Congress Joint Economic Committee, 2002). One year after September 11th , the U.S. remained largely uncovered.

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The President and the Congress viewed such a situation as unsustainable. There was thus a call for some type of federal intervention (U.S. General Accounting Office, 2002). The Terrorism Risk Insurance Act of 2002 (TRIA), which provides for up to $100 billion of terrorism insurance, was passed by Congress on November 26, 2002 and signed into law by President Bush the following month. The Act, based on risk sharing between the insurance industry and federal government, expires on December 31, 2005. Currently it is unclear what type of terrorism insurance program will emerge in the United States after 2005. One possibility is that TRIA will be renewed with the same or a new risk-sharing arrangement between the insurance industry and the federal government. However, if the program is terminated, alternative solutions will need to be found and implemented.

Some economists favor a laissez-faire public policy contending that the private market alone has the capacity to develop a market for covering terrorism risks and any government intervention limits the development of private solutions. (Gron and Sykes, 2002; Jaffee and Russell, 2003). Others argue that if there is any private market failure, it rests with current government policies (e.g., tax, accounting and regulation). Changing these policies so that it would be less costly for insurers to hold surplus capital and freely adjust prices would make private insurers more likely to cover the terrorism risk adequately (Smetters, 2004).

Given the developments since September 11th and the specific characteristics of large-scale international terrorism, we contend that government needs to continue to play an important role in concert with the private sector in providing insurance against losses from this type of extreme event. However, as we suggest in this paper, TRIA may not be the most desirable way for the federal government to assist the private sector in providing insurance against terrorism.

Private and Public Sector Responses to 9/11

America Largely Uncovered

The terrorist attacks of September 11, 2001 killed nearly 3,000 people from over 90 countries and inflicted between $30 and $35 billion in insured losses that was shared by nearly 150 insurers and reinsurers worldwide (Lehmann 2004; Dubois, 2004). These attacks were the most costly event in the history of insurance, inflicting insured losses nearly twice that of Hurricane Andrew in 1992, the previous record holder. Commercial property, business interruption, workers' compensation, life, health, disability, aircraft hull, and general liability insurance lines each paid out claims in the billions of dollars. (Hartwig, 2002).

Reinsurers (most of them European) were responsible for the bulk of these claims. For them, the 9/11 terrorist attacks came on top of a series of catastrophic natural disasters over the past decade and portfolio losses due to stock market declines. Having their capital base severely hit, most reinsurers drastically reduced their terrorist offerings or even stopped providing this coverage in the U.S. Hence in the immediate aftermath of September 11th insurers found themselves with significant amounts of terrorism exposure from their existing portfolio with limited possibilities of obtaining reinsurance to reduce the losses from a future attack. The few that did provide insurance to their clients charged very high prices[1], so except for a few exceptions only organizations that were required to have this coverage actually purchased it.

The response by the insurance industry to the 9/11 terrorist attacks could have been predicted by the literature on insurance firm behavior following catastrophic events.[2] In the short run, large losses from a specific disaster reduce surplus and hence the capacity to provide coverage. Given the high transaction costs of raising outside capital to replenish surplus and the relatively high interest rates associated with these funds, firms reduce the amount of coverage they offer and increase the price of insurance for the particular risk that caused the losses. Unlike reinsurers, primary insurers must obtain approval from state regulatory agencies when implementing new coverage restrictions. The immediate lack of terrorism insurance was due in part to the fact that this exposure was not explicitly priced and then caused large insured losses. (Gron and Sykes, 2002).

In October 2001, the Insurance Services Office (ISO), on behalf of insurance companies, filed a request in every state for permission to exclude terrorism from all commercial insurance coverage (U.S. General Accounting Office, 2002). The construction and real estate industry lobbied for some type of public sector involvement because they claimed that the lack of available terrorism coverage delayed or prevented several projects from going forward due to concerns by lenders or investors (U.S. GAO, 2002). Such lack of private insurance coverage led to the passage of the Terrorism Risk Insurance Act of 2002.

TRIA: A Temporary Answer

Under TRIA's three-year term insurers are obligated to make available an insurance policy against terrorism to all their clients, who then have the option of refusing the coverage except for workers' compensation where terrorism protection cannot be excluded from an insurance policy[3]. Insured losses from commercial lines and business interruption insurance are covered only if the U.S. Treasury

[1] For example, prior to 9/11, the Chicago's O'Hare airport carried $750 million of terrorist insurance at an annual premium of $125,000. After the terrorist attacks insurers only offered $150 million of coverage at an annual premium of $6.9 million (Jaffee and Russell, 2003).

[2] See Winter (1988, 1991), Gron (1994); Doherty and Posey (1997), Cummins and Danzon (1997); Froot and O'Connell (1997, 1999). Doherty, Lamm-Tennant and Starks (2003) provide an empirical study of market reactions to 9/11.

[3] Although the act expires on December 31, 2005, the "make available" requirement of the act is scheduled to expire on December 31, 2004, but the Secretary of Treasury has the authority to extend this requirement by one additional year.

Secretary certifies the event as an "act of terrorism" carried out by foreign persons or interests[4] and only for losses in excess of $5 million.

There is a specific risk-sharing arrangement between the federal government and insurers that operates in the following manner. First, the federal government is responsible for paying 90% of each insurer's primary property-casualty losses during a given year above the applicable *insurer deductible*, up to a maximum of $100 billion; the insurance company pays the remaining 10% in addition to the deductible. This deductible is determined as a percentage of the direct commercial property and casualty earned premiums of each insurer the preceding year. The percentage varies over the three-year operation of TRIA: 7% in 2003, 10% in 2004 and 15% in 2005. Many insurance companies found themselves in the situation of having to set a price for a risk they would have preferred not to write. Although their exposure to losses from terrorism has been reduced through the private-public partnership created by TRIA, it is still significant.[5]

Second, if the insurance industry suffers terrorist losses that require the government to cover part of the claim payments, then these outlays can be partially recouped *ex post* by the U.S. Treasury through a mandatory policy surcharge. In other words, eventually the federal government will pay only for insured losses above specific insurance marketplace retention amounts. That amount is specified as $10 billion in 2003, $12.5 billion for 2004 and $15 billion for 2005. The collection of funds by the government from insurers applies to insured losses that are higher than the total market deductible threshold level and below the market retention level. This financial obligation is imposed on insurers writing lines of coverage that are included in TRIA. To cover these expenditures insurers can impose a surcharge applied to all property and casualty insurance policies whether or not the insured has purchased terrorist coverage.

An important element of this program is that the federal government does not receive any premium for providing this coverage. With respect to catastrophic losses, while the overall effect on the crowding-out of private solutions is not clear a priori, there is no way reinsurers can compete with a zero cost federal terrorism reinsurance program. This limits the role of reinsurance companies to covering the deductible and the 10% share of the insurer's potential liability from a terrorist attack, a portion of risk for which they can quantify their maximum exposure (Dubois, 2004).

Congress passed TRIA because it is convinced that the existence of a viable terrorism insurance market is a cornerstone for a system of national preparedness since it impacts on a variety of economic

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[4] A domestic terrorist event like the Oklahoma City bombings of 1995, which had been the most damaging terrorist attack on domestic soil before 9/11 –killing 168 people and inflicting losses mostly to federal property and employees– would not be covered under TRIA. TRIA does not cover life insurance, so that standard policies for this coverage will continue to cover these losses. The law also excluded punitive damages from coverage.

[5] The deductible level under TRIA can be large for most US insurers. A recent study estimates that AIG's 2004 deductible would be $2.7 billion, others like Travelers, ACE, Chubb or Berkshire would have lower 2004 deductibles: $928 million, $743 million, $600 million and $200 million, respectively (Morgan Stanley, 2004).

activities. The expectation was that TRIA would ease insurers concerns about suffering large losses from future disasters and hence they would offer terrorism coverage at premiums that would be attractive to firms at risk who would then decide to purchase it. The goal of improving the availability of terrorism insurance, particularly for high-risk properties in major metropolitan areas, was achieved with the "mandatory offer" requirement.

Empirical Evidence on Market Penetration

The studies that have been undertaken on the market penetration suggest that there have been few takers of terrorism insurance. The Council of Insurance Agents and Brokers (CIAB) undertook the first national survey in March 2003 on the level of demand for coverage (CIAB, March 2003). Almost half of the brokers who responded to the survey indicated that fewer than 20% of their largest commercial P&C accounts (customers who pay more than $100,000 annually in commission and fees to the broker) had purchased terrorism insurance. The low demand was even more pronounced for smaller companies (less than $25,000 in commission and fees to the broker): 65% of the brokers indicated that less than 1 in 5 customers were purchasing this coverage.

According to another national survey by the CIAB undertaken in Spring 2003, 72% of the brokers indicated that their commercial customers were still not purchasing terrorism insurance (CIAB, July 2003). Even in locations like New York City, the level of demand remained low two years after the attacks. During the autumn of 2003, the New York-based insurance brokerage firm, Kaye Insurance Associates, surveyed 100 of its clients at middle market real estate, retail and manufacturing in the New York area on a series of insurance-related issues, including terrorism. Only 36% of the companies indicated that they had purchased terrorism coverage. A recent national survey realized by Marsh Inc on 2,400 of its policyholders indicated that an average of 27% of responders did purchase terrorism insurance in 2003. (Marsh inc, 2004).

Large firms that protected themselves against terrorism are now typically paying an additional 20% of the standard commercial property/casualty premium for this insurance. Most small and medium firms pay 10% of the standard premium. (Kaye, 2003). If that level of demand continues this means that an attack similar to the one on the World Trade Center, would very likely have a much more devastating effect on business continuity today than after 9/11 because losses would be much less diversified.

While TRIA limits the potential losses to the insurance industry, some insurers are still concerned about the impact of a large terrorist attack on their ability to pay claims, so that those who purchase insurance are aware that they face a credit risk. Some businesses are concerned not only with acts of terrorism certified by the federal government but also by the prospect of domestic terrorism, which would not be covered by TRIA. The supply of this coverage by the private sector is still mixed: some insurers offer domestic terrorism coverage (sometimes at no cost if the risk is perceived to be low) while others exclude it (CIAB, March 2003). In the latter case, businesses may prefer not to buy any terrorism insurance than having just partial protection under TRIA's terms.

Heuristics and Behavioral Biases

It often takes a disaster to get people to pay attention to the need for protection. If they do not experience future losses over a relatively short period of time, many individuals assume that the disaster "will not happen to me" and that their financial resources could be utilized more effectively elsewhere. This behavior has been well documented for natural hazards insurance where resident in hazard-prone area often purchase insurance only after suffering a loss from a disaster and then cancel their policies several years later should they be unscathed during this period. It is hard to make a convincing case that the best return on an insurance policy is no return at all. In other words, there is a tendency for most people to view insurance as an investment rather than as a form of protection (Kunreuther, 1996).

It is thus not surprising that a few years after 9/11, concern with damage from terrorism has taken a back seat. In 2003, most firms believed that if a terrorist attack occurred, it would not affect them, whereas in the first few months after 9/11, they had the opposite belief. The aforementioned CIAB study indicated that more than 90% of the brokers said that their customers are not considering terrorism insurance because they think they do not need it (CIAB, July 2003). These firms feel that insurance, even at relatively low premiums, is a bad investment, or even a questionable expense. Moreover, suppliers of terrorism insurance are likely to charge higher premiums than normal because of the large uncertainty surrounding this risk and the possibility of a concentrated loss in a metropolitan area that could lead to insolvency. The expectation that government may financially aid affected businesses whether or not they are covered by insurance, as illustrated by the airline industry following 9/11, may also contribute to the unwillingness of firms to purchase a policy.

Is TRIA Failing?

There seems to be a large difference in the perception of the seriousness of the terrorist threat by those who are potential buyers of insurance and those who are supplying coverage under the mandatory offer provision. In these circumstances, TRIA will not solve the problem alone. Accordingly, the U.S. General Accounting Office recommended recently that the Secretary of the Treasury, after consultation with insurance industry and experts, identify for Congress alternatives that may exist to expand the availability and affordability of terrorism insurance after TRIA expires at the end of 2005. (U.S. GAO, 2004).

If one wants to create a market for terrorism insurance, both buyers and sellers need to do a more systematic analysis of the nature and characteristics of terrorism and the relationship between the price of protection and the implied risk. There is no guarantee that in revising their beliefs firms will be willing to pay more for coverage or that insurers will greatly reduce their premiums. But there is a much better chance that a larger market for terrorism coverage will emerge than if the status quo is maintained.

Why Is Terrorism Different?

In order to develop key features of a sustainable terrorism insurance program for the U.S., it is important to examine the special features of the risk and its implications for setting premiums, determining how much coverage can be provided by the private sector and the appropriate role that the public sector can play in creating a more sustainable market for protection.

Evidence on Change in the Nature of the Risk

There is empirical evidence that the characteristics of terrorism risk have changed over the past decade. There has been a significant rise in casualties from transnational incidents in the 1990s, even though the total number of attacks worldwide has been decreasing. (U.S. Department of State, 2003; Enders and Sandler, 2000). One possible explanation for this change in the nature of terrorist attacks is the increasing number of religious-based terrorist groups, most of whom advocate mass casualties. (Hoffman, 1998; Pillar, 2001; Stern, 2003).[6]

The main concern today when dealing with challenges for terrorism risk coverage relates to the potentiality of major terrorist, including those using losses from chemical, biological, radiological and nuclear weapons of mass-destruction (CBRN). These are covered under TRIA only if the primary insurer has included these risks in its standard commercial policy. (Kunreuther and Michel-Kerjan, forthcoming).

In this regard, the 9/11 events and the anthrax attacks during the fall of 2001 have revealed an underrecognized new kind of vulnerability of our *critical infrastructure sectors* as defined by U.S. Presidential Decision Directive 63 (White House, 2003). In order to inflict mass casualties or large-scale threat, terrorists may not even try to destroy some elements of a network infrastructure. Rather they are likely to seek ways to use the huge diffusion capacity of our large critical networks and turn them against the target population so that each element of the network (e.g. every aircraft, every piece of mail) now becomes a potential weapon, and the entire network is at risk. (Michel-Kerjan, 2003-a). Thus following

[6] Fundamentalist-based terrorism appears to have started in the fourth quarter of 1979 with the takeover of the U.S. Embassy in Teheran (Enders and Sandler, 2000). In 1980, there were only two religious groups out of the 64 active terrorist organizations. Over the next 15 years, the number increased, so that by 1995 46 percent of the terrorist groups were classified as having religion as a principal motivator for their actions. (Hoffman, 1997).

the terrorist attacks of 9/11 the FAA shut down the US civilian airline network, the first time such a decision had ever been made. Similar action was also seriously considered for the US postal network during the Anthrax crisis (Lagadec and Michel-Kerjan, 2004).

More generally, the response to a terrorist attack can be highly disruptive by imposing negative externalities on the elements of the infrastructure that are not actually at risk as well as on every other networks that depends on it. These reactions can create economic losses that are greater than the direct impacts of the attack itself. Terrorism insurance today will not provide coverage for many of these indirect losses resulting from the response to an attack[7].

Dynamic Uncertainty

In contrast to natural hazards where the large historical databases on past losses and scientific studies on the risks are in the public domain, data on terrorist groups' activities and current threats are normally kept secret for national security reasons. Some time series data on past terrorist acts are in the public domain, but they may not reflect the changing expectations of planned activities of terrorist groups. Whereas a natural disaster is observable, so one can trace the factors that caused the event, the elements leading to a terrorism attack may be difficult or impossible to determine. For example, the public still has no idea today who manufactured and disseminated the anthrax in the U.S. mailings during the autumn of 2001.

The scale and configuration of terrorist attacks of 9/11 represent a new type of vulnerability. Since terrorists are likely to adapt their strategy as a function of their own resources and their knowledge of the vulnerability of the entity they want to attack, the nature of the risk is continuously evolving. Terrorists may respond to security measures by shifting their attention to more vulnerable targets. They also may change the nature of their attack if protective measures in place make the likelihood of success of the original option much lower than another course of action (e.g. switching from hijacking to bombing a plane). This *substitution effect* has to be considered when evaluating the effectiveness of specific policies aimed at curbing terrorism[8] (Enders and Sandler, 1993).

The likelihood and consequences of a terrorist attack is determined by a mix of strategies and counterstrategies developed by a range of stakeholders and changing over time. This leads to *dynamic*

[7] For example, the City of Chicago was denied for insurance compensation for business losses that resulted from FAA's decision to ban takeoffs of all civilian aircraft regardless of destination on September 11, 2001. The specific clause of the insurance contract for business interruption specified covering only "direct result of a peril not excluded", imposing a territorial limitation that excludes interdependent effects (U.S. District Court, 2004).

[8] Central Intelligence Agency (CIA) director, George Tenet, suggested this behavior in his prophetic unclassified testimony of February 7, 2001, (prior to 9/11) when he said: "As we have increased security around government and military facilities, terrorists are seeking out 'softer' targets that provide opportunities for mass casualties" (CIA, 2001). Khalid Sheikh Mohammed, the Al Qaeda chief of military operations arrested in March 2003, has since explicitly admitted such a soft target strategy (Woo, 2004).

uncertainty (Michel-Kerjan, 2003-b). In that spirit, while large-scale terrorism risk resembles war risk, it is more complex. When a country is at war, there is an identifiable opponent and a well-specified geographical area for combat. With respect to terrorism, the enemy is comprised of networked groups throughout the world who can attack anywhere and at any time. This presents special challenges for insurers who need information in order to establish predictability for at least one year, but preferably over a period of years. Even perfect information on the likelihood of an attack during the coming month does little for an insurer that issues annual policies.

Interdependent Security

One of the positive features of insurance as a policy tool is that it encourages investment in protective measures through premium reductions. If the insurer can reduce its claims by having the policyholder undertake loss reduction measures then it can reward this action by lowering the cost of insurance. Suppose there are interdependencies between individuals or firms so that, even if you invest in protection, there is still the possibility of your being contaminated by others who did not undertake such measures. Insurers will take this into account when determining what premium to charge you for coverage against a particular risk.

Kunreuther and Heal (2003) and Heal and Kunreuther (2003) have addressed this issue of interdependency in the context of airline security where the actions of one airport or one airline can directly impact on the others. They formally show with specific game theoretic models that the more airlines that do not invest in security measures, the less incentive any airline has to incur this cost because passengers (possibly terrorists) and bags (possibly containing a bomb) can be transferred from an unsecured airline to one that has been secured without being inspected in the process.[9]

More generally, the interdependent risks across firms may lead all of them to decide not to invest in protection. They show that private insurer will not internalize those negative externalities in determining what premiums to charge against a specific risk. A social insurance program can institute regulations and standards to reduce these negative externalities to achieve a socially optimal level of investment in protection.

[9] One needs to examine airport security in the same light. The crash of PanAm103 over Lockerbie, Scotland in December 1988 was due to a bag loaded at Malta Airport on Malta Airlines transferred to a Pan Am feeder in Frankfort and onto PanAm 103 in London set to explode only if the plane flew over 28,000 feet (Lockerbie, 2001). The collapse of the World Trade Center on September 11, 2001 could be attributed in part to the failure of security at Logan airport in Boston where terrorists were able to board planes that flew into the twin towers.

Government Influencing the Risk

There is an even more fundamental difference between terrorism and other extreme events: international terrorism is a matter of national security as well as foreign policy. Government can influence the level of risk of future attacks through appropriate counter-terrorism policies and international cooperation to enhance general security and reduce the probability that attacks will occur. Some decisions made by a government as part of the foreign policy can also affect the will of terrorist groups to attack this country or its interest abroad (Lapan and Sandler, 1988; Lee, 1988; Pillar, 2001).[10] On a policy level, it is surprising to us how this fundamental nature of terrorism has not been highlighted in the current debate on public-private responsibilities for providing adequate financial protection to victims of terrorism.

Federal and state governments can also devote part of their budget to the development of specific measures on U.S. soil to protect the country. The creation of the new U.S. Department of Homeland Security in 2002 confirms the importance of this role in managing the terrorist risk. In this regard, government is an actor that can influence the risk and provide relevant information to the private sector for improving global security.

In that sense, terrorism risk is partly under the government's control and will change depending on at least two complementary strategies by the defenders. The first entails protective measures that could be adopted by those at risk. The second consists of actions taken by governments to enhance general security and reduce the probability that attacks will occur. In this sense, terrorism is a mixed private-public good.

A Sustainable Terrorism Insurance Program on the Agenda

Congress requires Treasury to assess the effectiveness of TRIA no later than June 30, 2005 to determine whether it should be renewed, an alternative terrorist insurance program be substituted for it or insurance coverage left solely in the hands of the private sector. As input into this process we now evaluate several alternative terrorism insurance programs.

Scenario 1. Laissez-faire Policy

In this scenario TRIA expires and a private market for terrorism insurance is allowed to operate without any federal backstop nor mandatory offer requirement. Private insurers protected themselves

[10] Large-scale terrorist attacks in Madrid, Spain on March 11, 2004, have been credited with altering the outcome of the Spanish election that occurred three days later, and hence raises the question as to the potential role of terrorism as a global political weapon.

against catastrophic losses through the purchase of reinsurance and catastrophe bonds. Businesses are covered to the extent that their brokers can negotiate insurance terms that are affordable.

A key question is what would be the market capacity to provide terrorism insurance? As of today with TRIA in place, reinsurers have cautiously returned to the market but most insurers have not purchased reinsurance probably as a result of relatively high prices charged for a limited amount of available coverage (U.S. GAO, 2004). Moreover, while alternative risk transfers, such as options and catastrophe bonds, emerged over the past decade to cover large losses from natural disasters by transferring part of the risks to the capital markets, except for a few special issuances[11], a sustainable market for catastrophe bonds to cover losses from terrorist attacks has ***not*** emerged since 9/11. (Kunreuther and Michel-Kerjan, forthcoming; U.S. GAO, 2003).

Some lessons learned from other extremes events provide insight into what is likely to happen under a laissez-faire scenario. Over time, fewer businesses are likely to purchase terrorism coverage if there are no future attacks, as the risk will be below the firm's threshold level of concern. This may be considered an efficient outcome until after the next terrorist attack where providing adequate financial protection to victims of catastrophes will become a national issue. Facing potential catastrophic damage, the private sector may again severely restrict the insurance supply or even refuse to provide coverage. In other words, insurers and reinsurers fold up their tents temporarily again, as they did it after 9/11. Under public pressure, it would be politically impossible for the government not to compensate the uninsured for damage they sustain. In such a case, another TRIA-like bill is likely to pass.

There is empirical evidence from other disasters to suggest that a laissez faire program will be unsustainable. Following Hurricane Andrew in 1992, insurers were prepared to cancel windstorm coverage in hurricane-prone areas of Florida. The state legislature passed a law the next year that individual insurers could not cancel more than 10 percent of their homeowners' policies in any county in any one year and that they could not cancel more than 5 percent of their property owners' policies statewide. At the same time the Florida Hurricane Catastrophe Fund was created to relieve pressure on insurers should there be a catastrophic loss from a future disaster (Lecomte and Gahagan, 1998). In California insurers refused to renew homeowners' earthquake policies after the 1994 Northridge earthquake and the California Earthquake Authority was formed in 1996 with funds from insurers and reinsurers (Roth, Jr., 1998). Moreover, there has been little movement and coordination from insurers and

[11] The first terrorism catastrophe bond was issued in Europe in August 2003. The world governing organization of association football (soccer), the FIFA, which organizes the 2006 World Cup in Germany, developed a bond to protect its investment under very specific conditions. The catastrophe bond is not, however, a terrorist bond per se but covers against *both* natural and terrorist extreme events that would result in the cancellation of the final World Cup game without the possibility of it being re-scheduled to 2007.

reinsurers toward developing a private-industry program that could provide sufficient capacity without government participation (U.S. GAO, 2004).

Scenario 2. Mutual Insurance for Specific Lines

An alternative to scenario 1 is the creation of mutual insurance pools to deal with specific lines of coverage. This solution has the advantage of spreading the risk over a large number of insurers who join these pools, but it is unclear how this alternative would provide adequate coverage against mega-terrorism.

For example, a group of fourteen U.S. workers' compensation insurers that accounts for roughly 40% of the market recently assessed the feasibility of a workers' compensation (WC) terrorism reinsurance pool, since terrorism protection cannot be excluded from WC coverage (Towers Perrin, 2004). The feasibility study, released in March 2004, concluded that while the pool could create some additional capacity for each of its members, it would not be enough to matter in the case of a large-scale terrorism attack. The report concluded that extreme terrorist attacks could inflict workers' compensation losses of $90 billion, three times the capital backing of the private industry's capacity for covering this line of business. In addition the report concluded that it would be difficult to reach an agreement on the rates that should be charged based on terrorism exposure of pool participants (Towers Perrin, 2004).

Scenario 3. A Private-Public Partnership

In our view a partnership between the insurance industry and the government is essential for terrorism coverage when TRIA expires. Here we outline a program whereby TRIA is modified to provide terrorism coverage through a four-layer private-public partnership.

The insured would be responsible for the initial level of losses through a specific deductible on its policy. The size of the deductible could be based on the nature of loss reduction measures in which the insured would have invested. The more that the investor has protected itself against a potential loss, the lower the deductible would be for the same premium. For losses above the deductible, we propose that insurers **and** reinsurers cover middle-sized losses up to a specific threshold (market retention). One option for the private sector would be the creation of a pool arrangement similar to current programs in European countries. There could be a pre-existing arrangement for the pool to obtain federal loans at low rates should the reserve of the pool not be sufficient during its first years of operation to reimburse its liability in case of major attack.

Additional layers of coverage could be placed with the reinsurance market. If their financial commitment is well-defined and limited to a reasonable amount of coverage, a few large insurers and reinsurers could take the lead of developing a consortium of international insurers and reinsurers to cover a specific trench of the program, as has been done by Swiss Re in France or Berkshire Hathaway in Germany. (Michel-Kerjan and Pedell, 2004). If reinsurers are willing to provide substantial amounts of coverage this may convince also investors to provide capital for a terrorist cat bond market to emerge.

Above the threshold of private coverage, state and federal reinsurance could cover 100% of losses for extreme events rather than just 90% covered under TRIA. Indeed, the public sector has the capacity to diversify the risks over the entire population and to spread past losses to future generations of taxpayers, a form of cross-time diversification that the private market cannot achieve because of the incompleteness of inter-generational private markets and legal limitations for insurers to accumulate financial reserves (Gollier, 2002; Smetters, 2004). While there may be a cost associated with federal intergenerational diversification, as it would be done through the tax system, this is particularly important for extreme losses that pose severe problems of liquidity and possible insolvency to insurers.

Such government reinsurance protection should not be provided gratis as is currently done under TRIA with losses imposed *ex post* on every taxpayer. Although insurers would increase their premiums to reflect such a reinsurance cost, the resulting rates would more closely reflect the terrorist risk. The resulting premiums should also encourage insurers to give more substantial premium/deductible reductions to those insured firms who invest in protection, since these mitigation measures would reduce the potential magnitude of the catastrophic losses from a terrorist attack and reduce the amount of federal reinsurance that the insurer would require.

Will a Pool Arrangement Work?

One advantage of the creation of an insurance pool to cover the second layer of the program would be, beyond the mutualization of the risk among several stakeholders, to link insurance with global protection and mitigation measures more systematically as well as internalizing some of the externalities and interdependencies associated with terrorism risk. For example, insurers may want to require *ex ante* specific risk reduction measures as a condition for coverage and negotiate a specific arrangement with the public sector for reimbursement of business interruption losses resulting from federal responses to an attack, such as shutting down the airlines or the postal system. If a pool arrangement emerges as a possible program, then national associations of insurers and reinsurers, in partnership with the Treasury, will play a key role in its implementation.

There are, however, a set of challenges associated with the creation and operation of a pool arrangement. Should it be pre or post-funded? Should participation in the pool be voluntary or mandatory? To what extent could the pool diversify the risk and create additional capacity for each of its members? What rate scale should be charged by the pool and how could one reach a consensus among all potential members? What could be the relationship between premiums charged by primary insurers to policyholders and those charged by the pool to covers each member insurer?

In that regard, potential losses associated with a large range of scenarios of attacks are better understood today through the development of new terrorism risk models. These terrorism models developed since September 11th could be used to establish a national scale of rates charged by the pool based on terrorism exposure. (Kunreuther, Michel-Kerjan and Porter, in press). There are lessons to be learned from abroad so as how rates charged by pools established in other countries have been defined and how those programs work in practice. (Godard et al., 2002; Michel-Kerjan and Pedell, 2004).

Should Coverage Be Mandatory?

Existing institutions, such as banks and financial institutions, could require coverage as a condition for loans and mortgages to protect their own investments. Property owners would assume the cost of their risk through their insurance premiums and would be aided financially in their recovery process should a terrorist attack occur by being able to file a claim to cover their direct losses as well as business interruption. Rents to tenants in commercial buildings may increase to reflect the cost of terrorist insurance coverage. Mandatory coverage for these and other risks would obviously solve many difficult problems. First, there would be no concern about adverse selection since everyone would be insured. Second, it would eliminate the demand for federal aid sure to arise after an attack by those who failed to purchase insurance. Third, it would expand market for terrorism insurance, stabilize premium income and enable the insurance pool to diversify its risks across structures and geographical areas. By increasing the size of the pool, the chances would be reduced of a catastrophic loss exceeding the pool's resources.

To date the question as to whether insurance should be mandatory has *not* been explicitly raised in discussions of the future of terrorism insurance in the United States, whereas it was discussed 50 years ago as part of a national debate on the creation of war damage insurance program in the aftermath of World War II (Hirshleifer, 1953). It would likely take center stage if other terrorist attacks, even small-sized ones, occurred on U.S. soil. It is also worth noting that the more an industrialized country has suffered from international terrorism, the more likely such coverage has been made mandatory as illustrated by the cases of France and Spain.[12]

It is obviously much easier to defend a voluntary private market approach for providing terrorism insurance when no losses have been incurred. The lessons of September 11th indicate that there will be strong pressure for public sector involvement following any large-scale disaster. Considering some type

[12] In Israel compensation of victims of terrorism is funded by property tax charged *ex ante* against all property owner in the country.

of required insurance before such an event occurs should alleviate the political pressure for federal relief and facilitate the recovery process through insurance claims dispersed rapidly to those suffering losses.

Conclusion: TRIA and Beyond

The White House has defined *Homeland Security* as “the concerted effort to prevent attacks, reduce America’s vulnerability to terrorism, and minimize the damage and recover from attacks that do occur” (White House, 2002, p.2). Part of that “recovery component” is the need for insurance coverage. Prior to the passage of TRIA there was a national debate on the role and responsibilities of the federal government and the private sector in providing adequate protection to victims of terrorism. Today we believe there is a need for a private-public partnership to achieve that goal but question whether TRIA is the most appropriate form for this to take. If nothing is done after TRIA expires, insurers will probably significantly increase the price of coverage since free federal reinsurance will not be available. Many firms may decide not to offer this coverage to their clients since they will not required to do so, as the “. mandatory offer” requirement will stop as well as. This means that another mega-attack such as the one on 9/11 could have a much greater financial and social impact on the United States because much the loss would not be diversified through insurance and reinsurance worldwide.

Finally, while this paper makes the case for private-public partnerships for dealing with terrorism, one should recognize that creating and developing such arrangements calls for collaboration between a wide range of actors with different agenda within the public sector and industry. Developing such partnerships is challenging in a country where 85% of the critical infrastructure is owned or operated by the private sector. The U.S. federal government, because of its responsibilities to protect the citizenry, should partner more systematically with the private sector to develop effective protection measures nationwide and link them to a large and sustainable insurance market for terrorism risk that would assure the social and economic continuity of the country should other attacks occurs.

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